

Salt Watershed



SALT WATERSHED CHARACTERIZATION

SIZE	6,242 square miles (5% of the State's land area).			
POPULATION BASE	Approximately 40,500 people live in this watershed (estimated from the 2000 census). This is approximately 1% of the state's population.			
LAND OWNERSHIP (Figure 33)	Tribal	49%	Private	2%
	U.S. Forest Service	47%	Other state and federal	2%
LAND USES AND PERMITS (Figure 34)	Except for the Miami-Globe mining district, the basin is sparsely populated. Principal land uses on National Forest lands are recreation, grazing, and silviculture, with mining centralized in the Superior-Miami-Globe area. There are nine designated wilderness areas in this basin with restricted land uses and activities.			
HYDROLOGY AND GEOLOGY	<p>This watershed is defined by the Salt River drainage area from its headwaters to Granite Reef Dam, excluding the Verde River drainage area. The Salt River drainage area below Granite Reef Dam is included in the Middle Gila Watershed because the water in the Salt River is normally diverted at Granite Reef Dam into a system of canals and becomes hydrologically disconnected from its natural fluvial system. The watershed contains four surface water sub-basins: White River, Black River, Tonto River, and the Salt River. The perennial water in the White River and Black River sub-basins provides much of the water used in the Phoenix metropolitan area. Flow in the Salt River above Roosevelt Lake varies between 59 cfs (in 1955) to 143,000 cfs (in 1993), with an average annual flow of 929 cfs (USGS 1996).</p> <p>Ground water basins include: Tonto Creek Basin and the Salt River Basin, with a very small portion of the Phoenix Active Management Area. This watershed is primarily within the Central Highlands Province. The western portion of this watershed consists of rugged mountains, composed of igneous, metamorphic, and sedimentary rocks along with unconsolidated sediments that accumulate in the larger valleys. Groundwater occurs to some extent in these formations, although the amount varies widely depending on composition and structure of the rocks. Unconsolidated sands and gravel, which occur within the flood plain of streams and washes, are generally the most productive aquifers (ADWR 1994). The eastern portion of this watershed is dominated with volcanic materials such as basalt flows, cinder beds, tuffaceous agglomerates, and tuffs. Limited amounts of groundwater occur most predominately in cinder beds, fracture zones, and weathered zones (ADWR 1994). Due to the high elevations, steep gradients, and a predominance of hardrock, the entire watershed has high runoff and minimal natural water storage capabilities. Therefore the area is very susceptible to both drought and heavy groundwater pumping (ADWR 1994).</p>			
UNIQUE WATERS	None			
ECOREGIONS	Arizona-New Mexico Mountains			
OTHER STATES, NATIONS, OR TRIBES	<p>This watershed drains to the Middle Gila Watershed.</p> <p>White Mountain Apache, San Carlos Apache, and Salt River Indian tribes are significant stakeholders in this watershed as they own 49% of the land area.</p>			

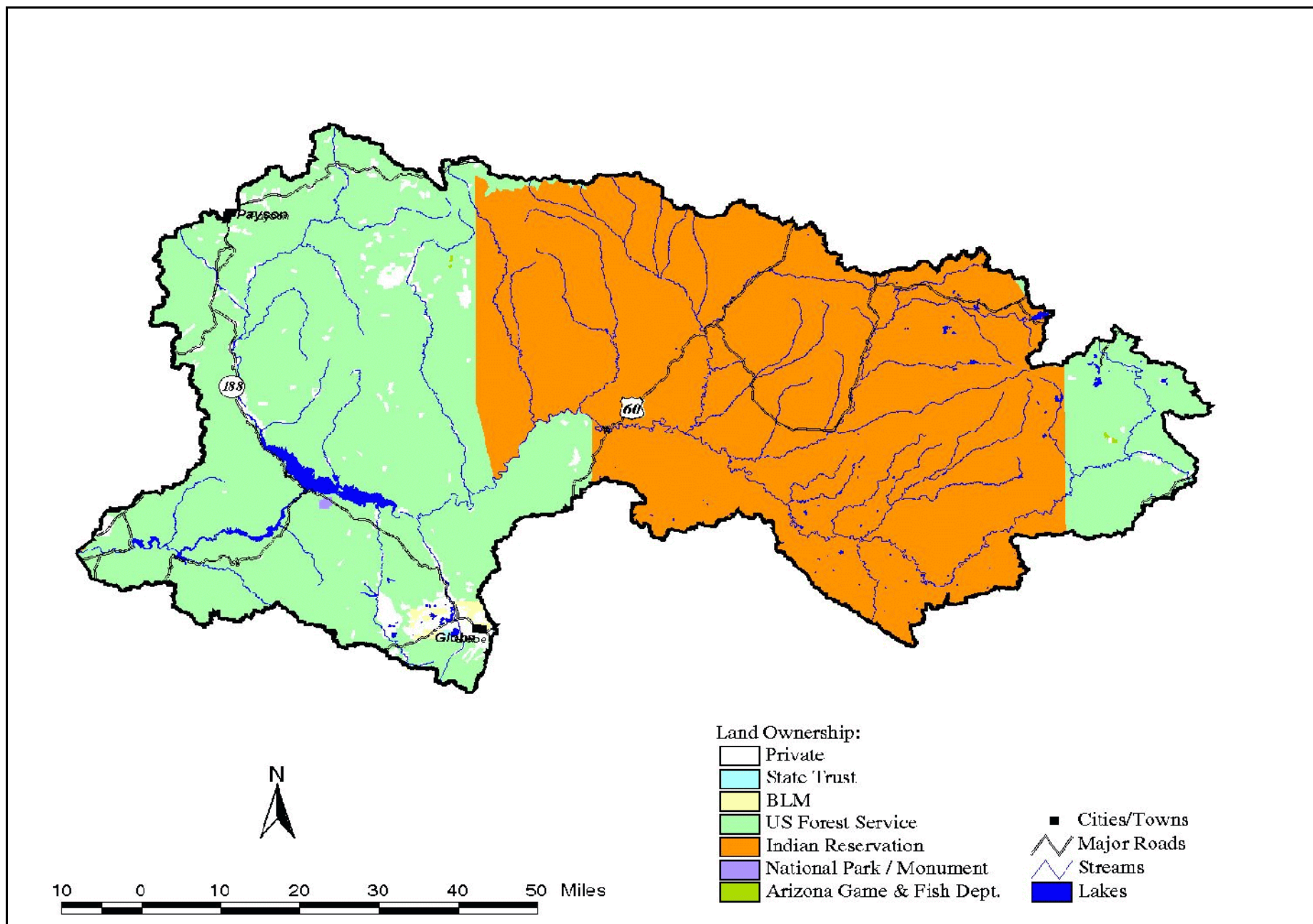


Figure 33. Land Ownership in the Salt Watershed

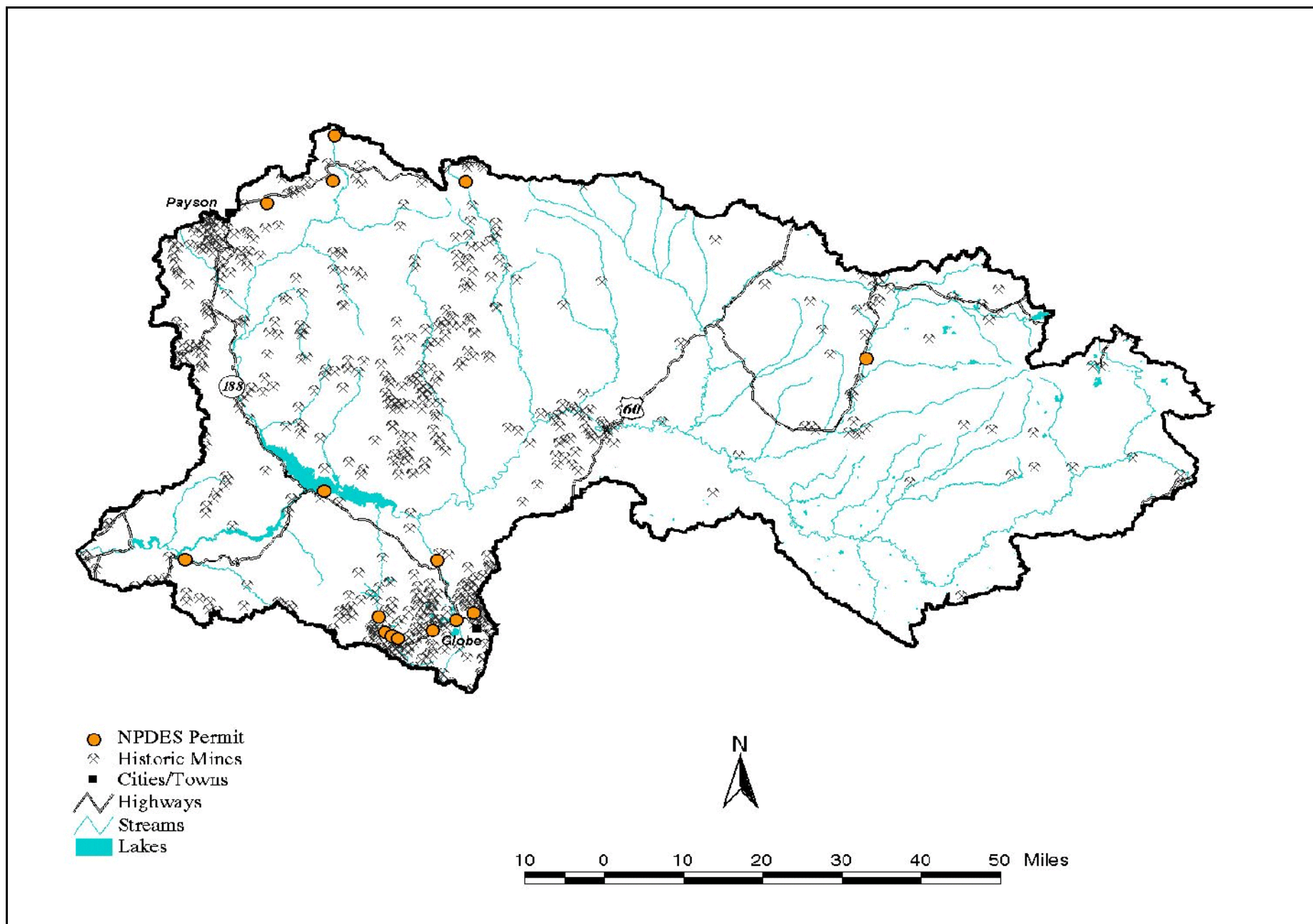


Figure 34. General Land Use and NPDES Permits in the Salt Watershed

Salt Watershed Assessment Discussion

Statistical Summary of Surface Water Assessments

Assessments – For the 2002 assessment, 193 miles of streams or washes, and 22,186 acres of lakes were assessed. Fewer assessment were completed than previously because of two factors: 1) changes in assessment criteria requiring more data to base an assessment, and 2) a lack of current credible data. This watershed will have additional water quality monitoring collected in 2002 and this new data will be included in the next assessment cycle.

Water quality assessment information for the Salt Watershed is summarized in the following tables and illustrated on **Figure 35**.

Table 18. Assessments in the Salt Watershed – 2002

	STREAMS		LAKES	
	miles	number of segments	acres	number of lakes
ATTAINING	64	5	1,022	1
INCONCLUSIVE	82	3	21,164	5
IMPAIRED	31	3	0	0
NOT ATTAINING	20	2	0	0
TOTAL ASSESSED	198	13	22,186	6

PERENNIAL SURFACE WATERS ASSESSED		STREAMS		LAKES	
		miles	number of segments	acres	number of lakes
	Assessed	168	10	22,187	6

* Note that streams with significant perennial stretches within the reach assessed were included in the perennial mileage although part of the reach may have ephemeral or intermittent flow.

Inconclusive Assessments – Surface waters with some monitoring data, but insufficient data to determine if a designated use is attaining or impaired, were added to the new Planning List. By the end of the next watershed monitoring cycle (scheduled in 2007), ADEQ expects to monitor these reaches and lakes so that all designated uses can be assessed during the following assessment cycle. Other lakes and streams which lack water quality monitoring data will be monitored depending on resources and priorities.

ADEQ will be working with US Geological Survey and the Arizona Game and Fish Department, so that their future monitoring will better support Arizona's surface water assessments.

Major Stressors – When a surface water is listed as impaired or not attaining a designated use, the pollutants or suspected pollutants causing the impairment are identified. The seven stream reaches assessed as impaired or not attaining a use can be divided into two groups based on pollutants and their probable sources:

- < Historic mining activities have caused impairment Pinto Creek and its unnamed (Gibson Mine) tributary due to copper; and
- < Turbidity exceeds standards along Tonto Creek and a tributary, Christopher Creek.

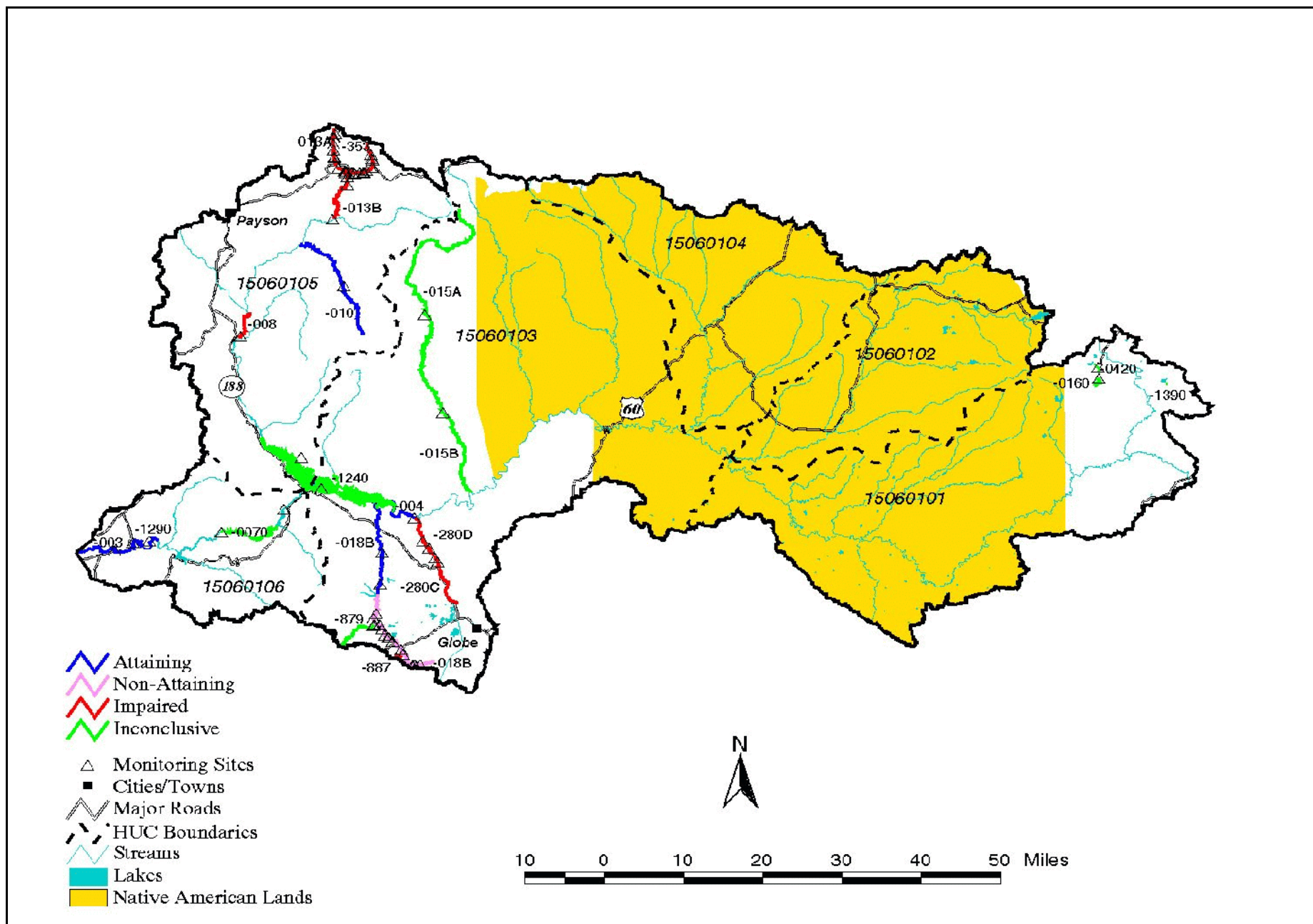


Figure 35. Salt Watershed Surface Water Assessments – 2002

TABLE 19. SALT WATERSHED – DATA MONITORING – 2002 ASSESSMENT

STREAM NAME SEGMENT WATERBODY ID DESIGNATED USES	AGENCY AND PROGRAM SITE DESCRIPTION SITE CODE ADEQ DATABASE ID	YEAR SAMPLED NUMBER AND TYPE OF SAMPLES	STANDARDS EXCEEDED AT THIS SITE PER SAMPLING EVENT					
			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
STREAM MONITORING DATA								
Bear Wallow Creek North Fork headwaters-Bear Wallow AZ15060101-022 A&Wc, FC, FBC, Agl, AgL	ADEQ Biocriteria Program Above South Fork Bear Wallow Creek SRNBE000.54 100605	1998 - 1 suite	OK					
	Reach Summary Row	1998 1 sampling event	OK				Not assessed	Insufficient data to assess.
Black River West Fork headwaters-Black River AZ15060101-048 A&Wc, FC, FBC, DWS, Agl, AgL	ADEQ Biocriteria Program West Fork abv. Thompson Creek SRWFB011.08 100692	1998 - 1 suite	OK					
	Reach Summary Row	1998 1 sampling event	OK				Not assessed	Insufficient data to assess.
Campaign Creek headwaters-Pinto Creek AZ15060103-037 A&Ww, FC, FBC, AgL	ADEQ Biocriteria Program At Superstition Wilderness edge SRCGN007.70 100431	1996 - 1 suite	OK					
	Reach Summary Row	1996 1 sampling event	OK				Not assessed	Insufficient data to assess.
Canyon Creek headwaters-Oak Creek AZ15060103-014 A&Wc, FC, FBC, DWS, Agl, AgL	ADEQ Biocriteria Program Above Valentine Canyon SRCYN031.50 100528	1997 - 1 suite	OK					
	Reach Summary Row	1997 1 sampling event	OK				Not assessed	Insufficient data to assess.
Cherry Creek headwaters-Salt River AZ15060103-015 A&Wc, FC, FBC, Agl, AgL	ADEQ Biocriteria Program Above Turkey Creek SRCHE024.73 100441	1997 - 1 suite	OK					Missing core parameters: some metals, bacteria, boron
	ADEQ Biocriteria Program Above Devil's Chasm SRCHE011.08 100442	1996 - 1 field + nutrients + NH3	OK					Missing core parameters: no metals, bacteria and boron

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	Reach Summary Row A&Wc Inconclusive FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive	1996 - 1997 2 sampling events Missing core parameters	OK				Inconclusive	ADEQ collected a total of 2 samples at two sites in 1996-1997. Reach is assessed as "inconclusive" due to missing core parameters and lack of sampling events.
Christopher Creek headwaters-Tonto Creek AZ15060105-353 A&Wc, FC, FBC, AgI, AgL	ADEQ Intensive Survey At See Springs (Headwaters) SRCRS003.26 100361	1996 - 2 suites, 1 bact	Ok					Missing core parameters: no boron or metals.
	ADEQ TMDL Program Upstream from recreation area SRCRS6.04 101027	2000 - 3 suites, 3 bact	Ok					
	ADEQ Intensive Survey Near See Springs Trail head parking - middle reference site SRCRS002.90 100436	1996 - 1 suite	Ok					
	ADEQ TMDL Program Downstream from recreation area SRCRS5.70 101028	2000 - 3 suites, 3 bact	Ok					
	ADEQ Intensive Survey Investigation Above Highway 260 SRCRS002.48 100362	1996 - 1 suite, 1 bact	Ok					
	ADEQ TMDL Program Above settlement of Christopher & Highway 260 Bridge SRCRS4.47 101029	2000 - 3 suites, 3 bact	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.7 - 9.7	1 of 3		Missing core parameters: no boron or metals. Field staff documented that naturally occurring ground water upwelling rather than any anthropogenic activities caused the low dissolved oxygen; therefore, not considered in the final assessment.

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	ADEQ Intensive Survey Investigation Below Christopher Creek Community SRCRS001.91 100363	1996 - 2 suites, 1 bact	Ok					Missing core parameters: no boron or metals.
	ADEQ TMDL Program By triangular cross-section cut through bedrock SRCRS3.56 101030	2000 - 3 suites, 3 bact	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.7 - 10.4	1 of 3		Missing core parameters: no boron or metals. Low dissolved oxygen is naturally occurring (see note above).
	ADEQ Intensive Survey Investigation Above Campground SRCRS001.56 100364	1996 - 2 suites, 1 bact	Ok					Missing core parameters: no boron or metals.
	ADEQ TMDL Program Above Christopher Creek Camp and below Hunter Creek SRCRS2.85 101031	2000 - 3 suites, 3 bact	Turbidity NTU	10 (A&Wc)	0 - 12.73	1 of 3		
	ADEQ Intensive Survey Below Tonto Natl Forest Camp SRCRS001.27 100365	1996 - 2 suites, 1 bact	Ok					
	ADEQ TMDL Program Below Christopher Creek Camp above Boy Scout Ranch SRCRS2.26 101032	2000 - 3 suites, 3 bact	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	5.8 - 8.1	1 of 3		Missing core parameters: no boron or metals. Low dissolve oxygen is naturally occurring (see note above).
			Turbidity NTU	10 (A&Wc)	0 - 13.97	2 of 3		Missing core parameters: no boron or metals.
	ADEQ Intensive Survey Below R-C Ranch SRCRS000.86 100366	1996 - 2 suites, 1 field (5 consecutive days of bacteria samples)	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	5.5 - 8.86	1 of 3		Missing core parameters: no boron or metals.
			Escherichia coli CFU/100 ml	580 (FBC) 130 Geometric mean (FBC)	68 - 3800 (978 geometric mean)	1 of 2 Geometric mean		Missing core parameters: no boron or metals.
			Turbidity NTU	10 (A&Wc)	1.61 - 894	1 of 2		Missing core parameters: no boron or metals.
	ADEQ TMDL Program At top of Box Canyon below RC Boy Scout Ranch SRCRS1.24 101033	2000 - 3 suites, 3 bact	Escherichia coli CFU/100 ml	580 (FBC)	1 - 689.3	1 of 3		Missing core parameters: no boron or metals.
			Turbidity NTU	10 (A&Wc)	0 - 88.63	2 of 3		

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	ADEQ FSN Intensive Survey Below Box Canyon SRCRS000.18 100367	1996 - 1 suite 1999 - 1 nutrients	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	5.98 - 7.4	1 of 1		Missing core parameters: no boron or metals.
			Escherichia coli CFU/100 ml	580 (FBC)	430 - 600	1 of 1		
			Turbidity NTU	10 (A&Wc)	80 - 294	1 of 1		
	ADEQ TMDL Program Above Tonto Creek, Below Box Canyon SRCRS0.08 101034	2000 - 3 suites	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.3 - 7.7	1 of 3		Missing core parameters: no boron or metals. Naturally occurring low dissolved oxygen (see note above).
			Turbidity NTU	10 (A&Wc)	0 - 13.77	2 of 3		Missing core parameters: no boron or metals.
	Reach Summary Row A&Wc Impaired FC Inconclusive FBC Inconclusive AgI Inconclusive AgL Inconclusive	1996 - 2000 39 sampling events Missing core parameters	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	5.5 - 10.4	2 of 38	Attaining	ADEQ collected a total of 39 samples at 16 sites in 1996-2000. Reach assessed as "impaired" due to turbidity. Add to Planning List due to bacteria exceedances and missing core parameters.
			Escherichia coli CFU/100 ml	580 (FBC)	1 - 3800	3 of 32	Attaining	
				130 Geometric mean (FBC)	978	1 exceedance	Inconclusive	
			Turbidity NTU	10 (A&Wc)	0 - 894	9 of 32	Impaired	
Deer Creek headwaters-Rye Creek AZ15060105-018 A&Wc, FC, FBC, AgL	ADEQ Biocriteria Program At Mazatzal Wilderness Boundary SRD4E003.91 100531	1996 - 1 suite	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	3.2	1 of 1		Field staff documented that low dissolved oxygen at low flows (<0.1 cfs) is due to ground water upwelling (naturally occurring low DO) and not anthropogenic sources. Exceedance is not included in the final assessment.
	Reach Summary Row	1996 1 sampling event					Not assessed	Insufficient data to assess.
Devil's Chasm Creek headwaters-Cherry Creek AZ15060103-801 A&Wc, FC, FBC	ADEQ Biocriteria Program Above Cherry Creek SRDEV000.29 100533	1996 - 1 suite	OK					
	Reach Summary Row	1996 1 sampling event	OK				Not assessed	Insufficient data to assess.
Fish Creek AZ15060106A-583 A&Ww, FC, FBC	ADEQ Biocriteria Program 0.25 miles upstream of Hwy 88 SRFSH004.06 100552	1997 - 1 suite	OK					

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	Reach Summary Row	1997 1 sampling event	OK				Not assessed	Insufficient data to assess.
Fish Creek headwaters-Black River AZ15060101-032 A&Wc, FC, FBC, Agl, AgL	ADEQ Biocriteria Program Near Bear Wallow Wilderness SRFIS002.53 100553	1997 - 1 suite	Copper (dissolved) µg/L	varies with hardness (A&Wc)	<1.0 - 33	1 of 1		
	Reach Summary Row	1997 1 sampling event	Copper (dissolved) µg/L	varies with hardness (A&Wc)	<1.0 - 33	1 of 1	Not assessed	Insufficient data to assess. Add to Planning List due to copper exceedance.
Haigler Creek headwaters-Tonto Creek AZ15060105-012 A&Wc, FC, FBC, Agl, AgL	ADEQ Biocriteria Program 1.4 miles below Alderwood Recreation site SRHAG003.51 100563	1997 - 1 suite	OK					
	Reach Summary Row	1997 1 sampling event	OK				Not assessed	Insufficient data to assess.
Haunted Canyon headwaters-Pinto Creek AZ15060103-879 A&Ww, FC, FBC, Agl, AgL	ADEQ TMDL Program 0.25 miles below Powers Gulch above Pinto Creek SRHNC000.40 101131	2000 - 1 metals	OK					Missing core parameters. The beryllium sample from this site was excluded because the Laboratory Reporting Limit was higher than the standard.
	ADEQ TMDL Program Haunted Canyon at Carlota Weir HC-4 SRPNT000.20 101072	2000 - 1 metals	Beryllium µg/L	0.21 (FC)	0.58	1 of 1		Missing core parameters.
	Reach Summary Row A&Ww Inconclusive FC Inconclusive FBC Inconclusive Agl Inconclusive AgL Inconclusive	2000 2 sampling events Missing core parameters	Beryllium µg/L	0.21 (FC)	0.58	1 of 1	Inconclusive	ADEQ collected a total of 2 samples at 2 sites. Reach assessed as “inconclusive” and should be added to the Planning List due to beryllium exceedance, missing core parameters, and lack of sampling events.
Hunter Creek AZ15060105-354 A&Wc, FC, FBC, AgL	ADEQ Fixed Station Monitoring Above Christopher Creek SRHUN000.07 100368	1996 - 1 suite	OK					
	Reach Summary Row	1996 1 sampling event					Not assessed	Insufficient data to assess.

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
<p>Pinal Creek Jesse Lane-Salt River AZ15060103-280D A&Ww, FBC, FC, AgL</p> <p>(Reach segment shifted slightly from previous assessments. From new underground stream barrier and treatment plant outfall. Approximately where perennial flow historically began, down to Salt River. Due to outfall, perennial flow begins at outfall.)</p> <p>(Sites listed in order going downstream from the outfall site.)</p>	USGS New treatment plant outfall	2000 - 3 suites	OK					Missing core parameters: turbidity, flow, bacteria, dissolved cadmium and chromium, total arsenic, beryllium, lead, copper, and mercury.
	Parametrix, Inc. for Pinal Creek Group just below outfall	2000 - 1 metals, pH 2001 - 1 metals, pH	OK					Missing core parameters: turbidity, flow, Escherichia coli.
	USGS Open File Report 97-247 At Head of Flow (HOF) SRPNL006.64	1996 - 6 suites 1997 - 6 suites 1998 - 5 suites 1999 - 7 suites	Copper (dissolved) µg/L	varies (65 max) (A&Ww)	<30 - 200	4 of 24		Results not included in the final assessment because samples were collected before new treatment methods were implemented. Other data supercedes this data.
			Fluoride mg/L	8.4 (FBC)	0.5 - 8.7	1 of 23		
			Manganese (total) µg/L	19,600 (FBC)	25000 - 66900	24 of 24		
			pH (Low) SU	6.5 - 9.0 (A&Ww, FBC, AgL)	5.4 - 6.5	23 of 24		
	USGS site 1.5	1999 - 1 suites	Manganese (total) µg/L	19,600 (PBC)	68300	1 of 1		Results not included in the final assessment because samples were collected before new treatment methods were implemented. Other data supercedes this data.
			pH (Low) SU	6.5 - 9.0 (A&We, AgL)	5.5	1 of 1		
			Zinc (dissolved) µg/L	varies (379 max) A&Ww)	1510	1 of 1		
	USGS At Setka Ranch #09498380	1996 - 6 suites 1997 - 6 suites 1998 - 5 suites 1999 - 7 suites	Copper (dissolved) µg/L	varies (65 max) (A&Ww)	<10 - 283	14 of 24		Results not included in the final assessment because samples were collected before new treatment methods were implemented. Other data supercedes this data.
			Manganese (total) µg/L	19,600 (FBC)	66 - 74700	24 of 24		
			pH (Low) SU	6.5 - 9.0 (A&Ww, AgL)	5.5 - 7.5	23 of 24		
		2000 - 2 suites 2001 - 5 suites 2002 - 3 suites	OK					Missing core parameters: flow, turbidity, bacteria; dissolve cadmium, chromium, copper; total mercury, lead, beryllium, arsenic.
	Phelps Dodge/Pinal Creek Group WQARF Monitoring At See Ranch SRPNL004.68	1998 - 1 metals, pH 1999 - 12 metals, pH	Cadmium (total) µg/L	50 (AgL)	<1 - 55	1 of 13		Results not included in the final assessment because samples were collected before new treatment methods were implemented. Other data supercedes this data.
			Copper (dissolved) µg/L	varies (65 max) (A&Ww)	<10 - 140	5 of 13		

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
			Manganese (total) µg/L	19600 (FBC)	<50 - 74900	13 of 13		
			pH (Low) SU	6.5 - 9.0 (A&Ww, FBC, AgL)	5.4 - 7.2	12 of 13		
		2000 - 9 metals, pH 2001 - 7 metals, pH 2002 - 3 metals, pH	OK					Missing core parameters: flow, turbidity, bacteria, total mercury, arsenic, and chromium
	Hydro Geo Chem, Inc. for Pinal Creek Group Translator Site at Sees Ranch	2000 - 8 metals, pH 2001 - 2 metals, pH	OK					Missing core parameters: flow, turbidity, bacteria; total mercury, copper, and lead
	USGS site Z1	1998 - 1 suite 1999 - 1 suite	Copper (dissolved) µg/L	varies (65 max) (A&Ww)	30 - 220	1 of 2		Results not included in the final assessment because samples were collected before new treatment methods were implemented. Other data supercedes this data.
			Manganese (total) µg/L	19,600 (FBC)	57800 - 65600	2 of 2		
			pH (Low) SU	6.5 - 9.0 (A&Ww, FBC, AgL)	5.9 - 6.2	2 of 2		
	USGS site Z2.2	2000 - 1 suite	Dissolved oxygen mg/L	6.0 (90% saturation) (A&Ww)	4.7	1 of 1		Low dissolved oxygen is natural due to the presence of groundwater upwelling. Missing core parameters: turbidity, flow, bacteria, and all total metals
	USGS site Z4.	1998 - 1 suite	Copper (dissolved)	varies with hardness (A&Ww)	190	1 of 1		Results not included in the final assessment because samples were collected before new treatment methods were implemented. Other data supercedes this data.
			Manganese (total) mg/L	19600 (FBC)	57,600	1 of 1		
			pH (low) SU	6.5 - 9.0 (A&Ww, FBC, AgL)	6.1	1 of 1		
			Zinc (dissolved)	varies with hardness (A&Ww)	1100	1 of 1		
		2000 - 1 suite	OK					Missing core parameters: turbidity, flow, bacteria, and all total metals
	Parametrix, Inc PNL 1B	2001 - 1 suite 2002 - 1 suite	OK					Missing core parameters: turbidity, flow, and bacteria.

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	USGS site Z4.3	1999 - 1 suite 2000 - 1 suite (before treatment began)	Dissolved oxygen mg/L	6.0 (90% saturation) (A&Ww)	0.9 - 3.6	2 of 2		Results not included in the final assessment because samples were collected before new treatment methods were implemented. Other data supercedes this data.
			Manganese (total) mg/L	19600 (FBC)	44900 - 49500	2 of 2		Natural low dissolved oxygen due to ground water upwelling noted by field personnel and not included as an exceedance.
			pH (low) SU	6.5 - 9.0 (A&Ww, FBC, AgL)	5.8 - 6.0	2 of 2		
	USGS site Z4.4	1999 - 2 suites 2000 - 1 suite (before treatment began)	Dissolved oxygen mg/L	6.0 (90% saturation) (A&Ww)	0.5 - 3.7	3 of 3		Results not included in the final assessment because samples were collected before new treatment methods were implemented. Other data supercedes this data.
			Manganese (total) mg/L	19600 (FBC)	44100 - 52700	3 of 3		Natural low dissolved oxygen due to ground water upwelling noted by field personnel and not included as an exceedance.
			pH (low) SU	6.5 - 9.0 (A&Ww, FBC, AgL)	5.9 - 6.0	3 of 3		
	USGS site Z4.5	2000 - 1 suite (before treatment began)	Dissolved oxygen mg/L	6.0 (90% saturation) (A&Ww)	3.2	1 of 1		Results not included in the final assessment because samples were collected before new treatment methods were implemented. Other data supercedes this data.
			Manganese (total) mg/L	19600 (FBC)	57900	1 of 1		Low dissolved oxygen is natural due to the presence of groundwater upwelling noted by field personnel and not included as an exceedance.
			pH (low) SU	6.5 - 9.0 (A&Ww, FBC, AgL)	6.0	1 of 1		
	USGS site Z4.7	1999 - 1 suite	Dissolved oxygen mg/L	6.0 (90% saturation) (A&Ww)	3.2	1 of 1		Results not included in the final assessment because samples were collected before new treatment methods were implemented. Other data supercedes this data.
			Manganese (total) mg/L	19600 (FBC)	52100	1 of 1		Low dissolved oxygen is natural due to the presence of groundwater upwelling noted by field personnel and not included as an exceedance.
			pH (low) SU	6.5 - 9.0 (A&Ww, FBC, AgL)	6.0	1 of 1		
		2000 - 3 suites 2001 - 1 suite	pH (low) SU	6.5 - 9.0 (A&Ww, FBC, AgL)	6.2 - 6.9	2 of 4		Exceedances only in the first 5 months of treatment.

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	
	USGS site Z5	2000 - 4 suites 2001 - 4 suites	Dissolved oxygen mg/L	6.0 (90% saturation) (A&Ww)	4.4 - 7.2	2 of 6		Only manganese exceedance occurred in October 2000 before treatment initiated and was not included in this assessment
			Manganese (total) mg/L	19600 (FBC)	7100 - 57600	1 of 6		Low dissolved oxygen is natural due to the presence of groundwater upwelling noted by filed personnel and not included as an exceedance.
			pH (low) SU	6.5 - 9.0 (A&Ww, FBC, AgL)	6.1 - 6.6	4 of 8		Low pH occurred only during the first 5 months after treatment was initiated. Missing core parameters: turbidity, flow, bacteria, and all total metals.
	USGS site Z5.7	2000 - 3 suites 2001 - 5 suites 2002 - 3 suites	Manganese (total) mg/L	19600 (FBC)	8700 - 54400	2 of 11		One manganese exceedances occurred in October 2000 before treatment was initiated and was not included in this assessment. Other exceedance occurred in January immediately after treatment began. Missing core parameters: turbidity, flow, bacteria, and all total metals.
	USGS site Z7	2000 - 3 suites 2001 - 5 suites 2002 - 1 suite	Manganese (total) mg/L	19600 (FBC)	5000 - 45900	2 of 9		One manganese exceedance occurred in October 2000 before treatment was initiated and was not included in this assessment. Other exceedance occurred in February 2 months after treatment began. Missing core parameters: turbidity, flow, bacteria, and all total metals.
	USGS site Z9a.	2000 - 4 suites 2001 - 5 suites 2002 - 3 suites	Dissolved oxygen mg/L	6.0 (90% saturation) (A&Ww)	5.5 - 8.0	1 of 6		Only manganese exceedance occurred in October 2000 before treatment was initiated and was not included in this assessment.
			Manganese (total) mg/L	19600 (FBC)	2400 - 31200	1 of 6		Low dissolved oxygen is natural due to the presence of groundwater upwelling noted by filed personnel and not included as an exceedance . Missing core parameters: turbidity, flow, bacteria, and all total metals.
	USGS site JJ15	2000 - 2 suites 2001 - 1 suite	OK					Missing core parameters: turbidity, flow, bacteria, and all total metals.

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	Phelps Dodge/Pinal Creek Group At Pringle	1998 - 1 metals and pH 1999 - 12 metals and pH 2000 - 3 metals and pH (before treatment initiated)	Beryllium (total) µg/L	0.21 (FC) 4.0 (FBC)	5.0	2 of 2 2 of 2		Results not included in the final assessment because samples were collected before new treatment methods were implemented. Other data supercedes this data.
			Copper (dissolved) µg/L	varies with hardness (A&Ww)	<10 - 100	3 of 16		
			Manganese (total)	19600	<50 - 26200	3 of 16		
		2000 - 9 metals and pH 2001 - 12 metals and pH 2002 - 9 metals and pH	pH (low) SU	6.5 - 9.0 (A&Ww, FBC, AgL)	6.2 - 7.7	1 of 30		Missing core parameters: turbidity, bacteria,
	Hydro Geo Chem, Inc for Pinal Creek Group At Inspiration Dam Translator site	2000 - 8 metals and pH 2001 - 2 metals and pH	OK					Missing core parameters: turbidity, bacteria, and some metals
	Parametrix, Inc For Pinal creek Group PNL 3	2000 - 1 metals and pH 2001 - 2 metals and pH 2002 - 1 metals and pH	OK					Missing core parameters: turbidity, bacteria, and some metals

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	Phelps Dodge/Pinal Creek Group At Inspiration Dam	1998 - 1 metals and pH 1999 - 12 metals and pH 2000 - 3 metals and pH (before treatment initiated)	Beryllium (total) µg/L	0.21 (FC) 4.0 (FBC)	5.0	2 of 2 2 of 2		Results not included in the final assessment because samples were collected before new treatment methods were implemented. Other data supercedes this data.
			Copper (dissolved) µg/L	varies (65 max) (A&Ww)	<10 - 80	3 of 16		
		2000 - 9 metals and pH 2001 - 7 metals and pH 2002 - 3 metals and pH	Ok					Core parameters missing: turbidity, bacteria, flow
	USGS At Inspiration Dam 100727	1996 - 6 suites 1997 - 6 suites 1998 - 5 suites 1999 - 4 suites	Beryllium (total) µg/L	0.21 (FC)	0.27 - 1.9	7 of 7		Results not included in the final assessment because samples were collected before new treatment methods were implemented. Other data supercedes this data.
			Manganese (total) µg/L	19600 (FBC)	180 - 53000	9 of 27		
			Turbidity NTU	50 (A&Ww)	0.19 - 140	1 of 26		
		2000 - 4 suites 2001 - 5 suites 2002 - 4 suites	Ok					All core parameters were tested.
	Parametrix, Inc For Pinal creek Group PNL 4 (high flow alternative to PNL 5)	2001 - 2 metals and pH	OK					Missing core parameters: turbidity, bacteria, and some metals
	Parametrix, Inc For Pinal creek Group PNL 5 near confluence with Salt River	2001 - 1 metals and pH 2002 - 1 metals and pH	OK					Missing core parameters: turbidity, bacteria, and some metals
	Reach Summary Row A&Ww Attaining FC Attaining FBC Attaining AgL Attaining	2000 (after treatment initiated) - 2002 175 total samples >60 sampling events	Manganese (total) µg/L	19600 (FBC)	<50 - 57900	2 of 105	Attaining	This monitoring illustrates the successful implementation of technology-based treatment through Arizona's WQARF- Superfund Program to bring a surface water back into compliance with its standards! (See further discussion in the special studies section of this watershed report.) Three monitoring entities contracted by the Pinal Creek Group and USGS have been monitoring this creek before and after the treatment was implemented. The exceedances shown in the summary row occurred shortly after the treatment was initiated. All designated uses are assessed as attaining their uses.
			pH (low) SU	6.5 - 9.0 (A&Ww, FBC, AgL)	5.8 - 7.2	7 of 160	Attaining	

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
Pinto Creek headwater-Ripper Spring AZ15060103-018A A&Ww, FC, FBC, Agl, AgL	ADEQ TMDL Program At Simpson Dam	2001 - 2 field, copper	OK					
	ADEQ TMDL Program Above Henderson Ranch Mines SRPNT023.02 101039	2001 - 1 suite, 3 field, copper	OK					
	ADEQ TMDL Program At Henderson Ranch Mines	2001 - 3 field, copper	OK					
	ADEQ TMDL Program Below Henderson Ranch Mines SRPNT022.89 101061	2001 - 1 suite, 3 field, copper	Copper (dissolved)	varies with hardness (A&Ww)	2 - 44	1 of 4		
			Zinc (dissolved)	varies with hardness (A&Ww)	390	1 of 1		
	ADEQ TMDL Program Above Gibson Mine Tributary SRPNT021.31 101062	2001 - 1 suite, 3 field, copper	Copper (dissolved) µg/L	varies with hardness (A&Ww)	17 - 40	3 of 4		
	ADEQ TMDL Program Below Gibson Mine Tributary SRPNT021.30 101063	2001 - 1 suite	Copper (dissolved) µg/L	varies with hardness (A&Ww)	560	1 of 1		
			Copper (total) µg/L	500 (AgL)	640	1 of 1		
	ADEQ TMDL Program At Old Highway 60 SRPNT020.65 101064	2001 - 1 suite	Copper (dissolved) µg/L	varies with hardness (A&Ww)	32 - 920	4 of 4		
			Copper (total) µg/L	500 (AgL)	810	1 of 4		
	ADEQ TMDL Program Above cactus breccia	2001 - 1 field, copper	Copper (dissolved)	varies with hardness (A&Ww)	33	1 of 1		
	ADEQ TMDL Program Below cactus breccia	2001 - field, copper	Copper (dissolved)	varies with hardness (A&Ww)	47	1 of 1		
	BHP Mining NPDES permit instream monitor Above Cottonwood Gulch AMP1	1997 - 1 field, 1 metals 1999 - 2 field, 2 metals 2000 - 1 field, 1 metals	OK					

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	BHP Mining NPDES permit instream monitor Above Cottonwood Gulch AMP2	1996 - 3 field, 3 metals 1999 - 2 field, 2 metals 2000 - 1 field, 1 metals	Copper (dissolved) µg/L	varies with hardness (A&Ww)	<20 - 110	1 of 6		
	BHP Mining NPDES permit instream monitor Below Cottonwood Gulch AMP3	1996 - 3 field, 3 metals 1999 - 3 field, 3 metals 2000 - 1 field, 1 metals	OK					
	BHP Mining NPDES permit instream monitor Below Miller Springs Gulch DW24	1998 - 2 field, 2 metals 1999 - 4 field, 4 metals 2000 - 3 field, 3 metals	OK					
	BHP Mining NPDES permit instream monitor Below DW24 Site PC2UP	1998 - 2 field, 2 metals 1999 - 4 field, 4 metals 2000 - 3 field, 3 metals	Beryllium µg/L	0.21 (FC)	<0.2 - 0.42	1 of 2		
	ADEQ TMDL Program At USGS Gage below Haunted Canyon SRPNT016.18 101068	2000 - 2 suites	OK					
	BHP Mining NPDES permit instream monitor Below Gold Gulch Weir & Haunted Canyon AMP4	1996 - 5 field, 6 metals 1997 - 2 field, 2 metals 1998 - 2 field, 2 metals 1999 - 4 field, 4 metals 2000 - 3 field, 3 metals	Beryllium µg/L	0.21 (FC)	<0.2 - 0.34	1 of 7		
			Turbidity NTU	50 (A&Ww)	0.64 - 56	1 of 13		
	Reach Summary Row A&Ww Not attaining FC Attaining FBC Inconclusive AgI Attaining AgL Attai ning	1996 - 2001* 80 samples 22 sampling events Missing core parameters: bacteria , nutrients	Beryllium µg/L	0.21 (FC)	<0.2 - 0.42	2 of 20	Attaining	ADEQ & BHP's Consultant collected a total of 80 samples from 18 sites. Reach assessed as "not attaining" due to copper. A copper TMDL was approved by EPA in 2001. * Monitoring data collected in 2001 was included in this assessment because 2000 was an exceptionally dry year.
			Copper (dissolved) µg/L	varies with hardness (A&Ww)	<20 - 920	13 of 78	Not attaining	
			Copper (total) µg/L	500 (AgL)	640 - 810	2 of 78	Attaining	
			Turbidity NTU	50 (A&Ww)	0.64 - 56	1 of 54	Attaining	
			Zinc (dissolved)	varies with hardness (A&Ww)	390	1 of 58	Attaining	

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
Pinto Creek Ripper Spring-Roosevelt Lake AZ15060103-018B A&Ww, FC, FBC, Agl, AgL	ADEQ Fixed Station Monitoring At Henderson Ford West of Globe SRPNT007.13 100346	1996 - 4 suites 1997 - 3 suites 1998 - 3 suites 1999 - 3 suites 2000 - 4 suites	Turbidity NTU	50 (A&Ww)	0.27 - 180	1 of 17		
	ADEQ TMDL Program At USGS Gage near Pinto Valley Weir SRPNT011.44 101070	2000 - 1 suite 2001 - 4 suites	OK					
	Reach Summary Row A&Ww Attaining FC Attaining FBC Attaining Agl Attaining AgL Attai ning	1996 - 2001* 22 samples 19 sampling events	Turbidity NTU	50 (A&Ww)	0.27 - 180	1 of 19	Attaining	ADEQ collected a total of 19 total samples at two sites in 1996-2000. Reach assessed as “attaining all uses.” (* Monitoring in 2001 was included in this assessment because 2000 was an exceptionally dry year.)
Pinto Creek’s unnamed tributary (a.k.a. Gibson Mine tributary) headwaters-Pinto Creek AZ15050103-887 A&Ww, FC, FBC, Agl, AgL	ADEQ TMDL Program Gibson Mine Tributary SRGIB000.01 101071	2001 - 1 suite, 3 field + copper	Beryllium µg/L	0.21 (FC)	0.51	1 of 1		
			Copper (total) µg/L	500 (Agl) 5000 (Agl)	2100 - 6200	4 of 4 2 of 4		
			Copper (dissolved) µg/L	varies A&Ww)	2100 - 5900	4 of 4		
			pH SU	6.5-9.0 (A&Ww, FBC, AgL)	5.3 - 6.73	1 of 4		
			zinc (dissolved) µg/L	varies (A&Ww)	96	1 of 1		
	Reach Summary: A&Ww Not attaining FC Inconclusive FBC Inconclusive Agl Inconclusive AgL Inconclusive	2001 4 sampling events	Beryllium µg/L	0.21 (FC)	0.51	1 of 1	Inconclusive	ADEQ collected 4 samples in 2001 (2001 data included in this assessment because previous years had been so dry.) Reach was assessed as “not attaining” as the approved TMDL on Pinto Creek also assigned a load to this tributary. That load is not yet being met. Also added to Planning List due to beryllium, pH, and zinc exceedances and lack of mercury and bacterial samples.
			Copper (total) µg/L	500 (Agl)	2100 - 6200	4 of 4	Inconclusive	
			Copper (total) µg/L	5000 (Agl)	2100 - 6200	2 of 4	Inconclusive	
			Copper (dissolved) µg/L	varies A&Ww)	2100 - 5900	4 of 4	Not attaining	
			pH SU	6.5-9.0 (A&Ww, FBC, AgL)	5.3 - 6.73	1 of 4	Inconclusive	

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
			zinc (dissolved) µg/L	varies (A&Ww)	96	1 of 1	Inconclusive	
Reservation Creek headwaters-Black River AZ15060101-010 A&Wc, FC, FBC, Agl, AgL	ADEQ Biocriteria Program Above Black River SRRES000.30 100629	1998 - 1 suite	OK					
	Reach Summary Row	1998 1 sampling event	OK				Not assessed	Insufficient data to assess.
Reynolds Creek headwaters-Salome Creek AZ15060103-202 A&Wc, FC, FBC, AgL	ADEQ Biocriteria Program Below McFadden Creek SRREY000.70 100630	1996 - 1 suite	OK					
	Reach Summary Row	1996 1 sampling event	OK				Not assessed	Insufficient data to assess.
Salome Creek headwaters-Roosevelt Lake AZ15060103-022 A&Wc, FC, FBC, Agl, AgL	ADEQ Biocriteria Program Below Little Turkey Creek SRSAL014.92 100636	1996 - 1 suite	OK					
	Reach Summary Row	1996 1 sampling event	OK				Not assessed	Insufficient data to assess.
Salt River Pinal Creek-Roosevelt Lake AZ15060103-004 A&Ww, FC, FBC, Agl, AgL	USGS Station #09498500 Above Roosevelt Lake SRSLR055.32 100745	1996 - 11 field 1997 - 13 field 1998 - 11 suites 1999 - 4 suites 2000 - 8 suites, 4 bact	Beryllium µg/L	0.21 (FC)	<0.1 - 0.6	1 of 13		
			Nitrogen (total) mg/L	2.0 (A&Ww)	0.16 - 2.1	1 of 47		
			Turbidity NTU	50 (A&Ww)	0.57 - 220	1 of 13		
	Reach Summary Row A&Ww Attaining FC Attaining FBC Attaining Agl Attaining Agl Attaining	1996 - 2000 47 sampling events	Beryllium µg/L	0.21 (FC)	<0.1 - 0.6	1 of 13	Attaining	USGS collected 47 samples in 1996-2000. Reach assessed as "attaining all uses."
			Nitrogen (total) mg/L	2.0 (A&Ww)	0.16 - 2.1	1 of 47	Attaining	
			Turbidity NTU	50 (A&Ww)	0.57 - 220	1 of 13	Attaining	
Salt River Saguaro Lake-Verde River AZ15060106A-003 A&Wc, FC, FBC, DWS, Agl, AgL	AGFD Below Stewart Mountain Dam SRSLR027.30	1999 - 2 field, 2 nutrient 2000 - 1 field, 1 nutrient	OK					
	SRP Below Stewart Mountain Dam WSRVSL2 SRSLR030.22	1996 - 12 suites 1997 - 12 suites 1998 - 11 suites 1999 - 12 suites 2000 - 14 suites, 9 pesticides	Copper (dissolved) µg/L	varies with hardness (A&Ww)	11 - 110	1 of 61		

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	USGS Station #09502000 Below Stewart Mountain Dam SRSLR033.55	1999 - 2 suites, 2 bact 2000 - 6 suites, 6 bact	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	4.1 - 9.4	2 of 8		
	Reach Summary Row	1996 - 2000 72 sampling events	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	4.1 - 10.3	2 of 11	Attaining	AGFD collected 3 samples in 1999-2000. SRP collected 61 samples in 1996-2000. USGS collected 8 samples in 1999-2000. Reach assessed as "attaining all uses."
	A&Wc Attaining FC Attaining FBC Attaining DWS Attaining Agl Attaining AgL Attaining		Copper (dissolved) µg/L	varies with hardness (A&Ww)	11 - 110	1 of 61	Attaining	
Snake Creek headwaters-Black River AZ15060101-045 A&Wc, FC, FBC, DWS, Agl, AgL	ADEQ Biocriteria Program Near Bear Wallow Wilderness SRSNK001.19 100643	1998 - 1 suite	OK					
	Reach Summary Row	1998 1 sampling event	OK				Not assessed	Insufficient data to assess.
Spring Creek headwaters-Tonto Creek AZ15060105-010 A&Wc, FC, FBC, AgL	ADEQ Fixed Station Monitoring SRSPI006.79 100380	1996 - 6 suites	OK					Only 2 bacterial samples
	Reach Summary Row	1996 6 sampling events Missing core parameter (bacteria)	OK				Attaining	ADEQ collected 6 samples in 1996. Reach assessed as "attaining some uses." Could not assess Full Body Contact due to insufficient bacteria samples.
Stinky Creek headwaters-W est Fork Black River AZ15060101-352 A&Wc, FC, FBC, AgL	ADEQ Biocriteria Program Below Forest Road 116 SRSTI001.76 100652	1998 - 1 suite	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.54	1 of 1		Naturally occurring low dissolved oxygen due to ground water upwelling and low flow. Not included in the final assessment.
	Reach Summary Row	1998 1 sampling event					Not assessed	Insufficient data to assess.
Tonto Creek headwaters-Haigler Creek AZ15060105-013 A&Wc, FC, FBC, Agl, AgL	ADEQ Intensive survey At Headwater Spring Above AGFD Fish Hatchery SRTON043.98 100350	1999 - 1 nutrient	OK					
	ADEQ TMDL Program At Headwater Spring Above AGFD Fish Hatchery SRTON073.00 101016	2000 - 3 suites, bact	OK					

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	ADEQ Intensive survey Below AGFD Fish Hatchery SRTON043.52 100351	1999 - 1 nutrient	OK					
	ADEQ TMDL Program Below AGFD Fish Hatchery SRTON72.66 101017	2000 - 3 suites, bact	OK					
	ADEQ TMDL Program Above Baptist Camp and Dick Williams Creek SRTON71.72 101018	2000 - 3 suites, bact	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.75 - 8.8	1 of 3		Field staff documented that the low dissolved oxygen was due to naturally occurring low DO in ground water up welling in the stream and not due to any anthropogenic activities. Exceedances not considered in the final assessment.
	ADEQ TMDL Program Below Baptist Camp road bridge SRTON70.86 101019	2000 - 3 suites, bact	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.7 - 9.1	1 of 3		Naturally occurring low dissolved oxygen (see comment above).
	ADEQ TMDL Program Above Horton Creek confluence SRTON69.87 101020	2000 - 3 suites, 3 bact	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.4 - 17.1	1 of 3		Naturally occurring low dissolved oxygen (see comment above).
			Escherichia coli CFU/100ml	580 (FBC)	12 - 658.6	1 of 3		
	ADEQ TMDL Program Below Horton Creek confluence SRTON69.80 101021	2000 - 2 suites, 2 bact	OK					
	ADEQ TMDL Program Above Kohls Ranch & Highway 260, USGS Gage site SRTON68.95 101022	2000 - 3 suites, 3 bact	Turbidity NTU	10 (A&Wc)	3.42 - 19.8	1 of 3		
	ADEQ TMDL Program Below Kohls Ranch Above Tontozona SRTON68.00 101023	2000 - 3 suites, 3 bact	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.0 - 10.0	1 of 3		
			Turbidity NTU	10 (A&Wc)	5.69 - 28.5	2 of 3		
	ADEQ Intensive Survey Above Christopher Creek SRTON038.98 100359	1996 - 1 suite, 1 bact	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.29 - 7.06	1 of 1		
			Turbidity NTU	10 (A&Wc)	19.5 - 22.7	1 of 1		

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	ADEQ TMDL Program Above Christopher Creek SRTON66.90 101024	2000 - 3 suites, 3 bact	Turbidity NTU	10 (A&Wc)	8.81 - 54.5	3 of 3		
	ADEQ Intensive Survey Below Christopher Creek SRTON038.81 100360	1996 - 1 suite, 1 bact 2000 - 6 suites, 5 bact	Beryllium µg/L	0.21 (FC)	0.89	1 of 1		4 other beryllium samples were not used because the Laboratory Reporting Limit was too high to assess Fish Consumption.
			Turbidity NTU	10 (A&Wc)	1.36 - 78.4	3 of 6		
	ADEQ Intensive Survey Above Bear Flats south of Kohls Ranch SRTON038.32 100357	1996 - 3 suites, 2 bact	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.48 - 9.7	1 of 3		Sampled on 5 consecutive days with monsoon rains. These 4 consecutive samples were counted as one sampling event.
			Escherichia coli CFU/100ml	580 (FBC)	8 - 1400	1 of 2		
			Turbidity NTU	10 (A&Wc)	3.34 - 261	1 of 2		
	ADEQ TMDL Program Above Bear Flats Residence area, below Christopher Creek SRTON65.38 101025	2000 - 3 suites, 3 bact	Turbidity NTU	10 (A&Wc)	21.8 - 98	3 of 3		
	ADEQ TMDL Program Below Bear Flats Residence area access road SRTON64.22 101026	2000 - 3 suites, 3 bact	Turbidity NTU	10 (A&Wc)	28.43 - 101.4	3 of 3		
	ADEQ Fixed Station Monitoring Below Bear Flats south of Kohls Ranch SRTON037.17 100358	1996 - 1 suite	OK					
	Reach Summary Row	1999 - 2000	Beryllium µg/L	0.21 (FC)	0.89	1 of 1	Inconclusive	ADEQ collected a total of 44 samples from 17 sites. Reach assessed as "impaired" due to turbidity. Also, add to Planning List due to beryllium exceedance.
	A&Wc Impaired FC Inconclusive FBC Attaining AgI Attaining AgL Attaining	44 samples 11 sampling events	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.0 - 17.1	3 of 44	Attaining	
			Escherichia coli CFU/100ml	580 (FBC)	8 - 1400	2 of 41	Attaining	
			Turbidity NTU	10 (A&Wc)	1.36 - 261	23 of 43	Impaired	

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			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
Tonto Creek Haigler Creek-Spring Creek AZ15060105-011 A&Wc, FC, FBC, Agl, AgL	ADEQ Biocriteria Program At Hellsgate, below Haigler Cr. SRTON032.31 100669	1997 - 1 suite	OK					
	Reach Summary Row	1997 1 sampling event	OK				Not assessed	Insufficient data to assess.
Tonto Creek Rye Creek-Gun Creek AZ15060105-008 A&Wc, FC, FBC, Agl, AgL	ADEQ Fixed Station Monitoring Above USGS gage @ Jakes Corner SRTON015.88 100349	1996 - 5 suites 1997 - 4 suites 1998 - 4 suites 1999 - 3 suites 2000 - 4 suites	Turbidity NTU	10 (A&Wc)	0.5 - 36.2	7 of 20		
	Reach Summary Row A&Wc Impaired FC Attaining FBC Attaining Agl Attaining AgL Attain ing	1996 - 2000 20 sampling events	Turbidity NTU	10 (A&Wc)	0.5 - 36.2	7 of 20	Impaired	ADEQ collected 20 samples in 1996-2000. This reach of Tonto Creek was assessed as "impaired" by turbidity.
Workman Creek, headwaters-Salome Creek AZ15060103-195 A&Wc, FC, FBC, Agl, AgL	ADEQ Biocriteria Program Below Workman Creek Falls SRWRK005.34 100696	1996 - 1 suite	OK					
	Reach Summary Row	1996 1 sampling event	OK				Not assessed	Insufficient data to assess.
LAKE MONITORING DATA								
Apache Lake AZL15060106A-0070 A&Wc, FC, FBC, DWS, Agl, AgL	AGFD Routine Monitoring 3 sites combined SRAPA	1999- 2 field, 2 NH3, 2 nutrient	OK					Missing most core parameters
	ADEQ Clean Lakes Program SRAPA 100008	1996 - 1 suite	OK					Missing core parameters: bacteria
	Reach Summary Row A&Wc Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive Agl Inconclusive AgL Inco nclu sive	1996 - 1999 3 sampling events Missing core parameters	OK				Inconclusive	ADEQ and AGFD collected a total of 3 samples in 1996-1999. Lake assessed as "inconclusive" and added to the Planning List due to a lack of core parameters.
Big Lake AZL15060101-0160 A&Wc, FC, FBC, DWS, Agl, AgL	AGFD Routine Monitoring SRBIG	1996 - 2 field, 2 NH3, 2 nutrient 1997 - 1 field, 1 NH3, 1 nutrient	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.4 - 8.3	1 of 3		Missing most core parameters.

TABLE 19. SALT WATERSHED – DATA MONITORING – 2002 ASSESSMENT

STREAM NAME SEGMENT WATERBODY ID DESIGNATED USES	AGENCY AND PROGRAM SITE DESCRIPTION SITE CODE ADEQ DATABASE ID	YEAR SAMPLED NUMBER AND TYPE OF SAMPLES	STANDARDS EXCEEDED AT THIS SITE PER SAMPLING EVENT					
			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	Reach Summary Row A&Wc Inconclusive FC Inconclusive FBC Inconclusive DWS Inconclusive Agl Inconclusive AgL Inconclusive	1996 - 1997 3 sampling events Missing core parameters	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.4 - 8.3	1 of 3	Inconclusive	AGFD collected 3 samples in 1996-1998. Lake assessed as "inconclusive" and added to the Planning List due to missing core parameters.
Canyon Lake AZL15060106A-0250 A&Wc, FC, FBC, Agl, AgL	AGFD Routine Monitoring 3 sites combined SRCAN	1998 - 1 suite	OK					
	Reach Summary Row	1998 1 sampling event	OK				Not assessed	Insufficient data to assess.
Crescent Lake AZL15060101-0420 A&Wc, FC, FBC, Agl, AgL	AGFD Routine Monitoring SRCRE	1996 - 3 field, 3 NH3, 3 nutrients 1997 - 1 suite 1998 - 2 suites 1999 - 1 suite	pH (high) SU	6.5 - 9.0 (A&Wc, FBC, Agl, AgL)	7.97 - 10.1	5 of 7		Missing core parameters: turbidity, flow, dissolved metals, boron, bacteria, arsenic, beryllium, copper, lead, mercury.
	ADEQ Lakes Program SRCRE-B 100993	1999 - 1 suite	pH (high) SU	6.5 - 9.0 (A&Wc, FBC, Agl, AgL)	9.64 - 9.83	1 of 1		Missing core parameters: bacteria, total manganese and beryllium
			Nitrogen (total) mg/L	2	2.05	1 of 1		
	Reach Summary Row	1996 - 1999 8 sampling events	pH (high) SU	6.5 - 9.0 (A&Wc, FBC, Agl, AgL)	7.97 - 10.1	6 of 8	Inconclusive	ADEQ & AGFD collected a total of 8 samples from 2 sites in 1996-1999. Lake assessed as "inconclusive" and should be added to the Planning List due to pH and nitrogen did not meet standards and missing core parameters.
	A&Wc Inconclusive FC Inconclusive FBC Inconclusive Agl Inconclusive AgL Inconclusive	Missing core parameters	Nitrogen (total) mg/L	2	2.05	1 of 1	Inconclusive	
Roosevelt Lake AZL15060103-1240 A&Ww, FC, FBC, DWS, Agl, AgL	AGFD Routine Monitoring Dam Site SRROO	2000 - 8 suites	OK					At all four AGFD monitoring sites: 1. Missing core parameters: turbidity, bacteria, fluoride, barium, beryllium, dissolved metals, boron, lead. 2. Mercury Laboratory Reporting Limit is not low enough to assess Fish Consumption.
	AGFD Routine Monitoring Salt Arm Site SRROO	2000 - 7 suites	Dissolved oxygen mg/L	6.0 (90% saturation) (A&Ww)	5.6 - 13.15	1 of 7		
	AGFD Routine Monitoring Tonto Arm Site SRROO	2000 - 8 suites	Dissolved oxygen mg/L	6.0 (90% saturation) (A&Ww)	5.32 - 9.64	1 of 8		
	AGFD Routine Monitoring Windy Hill Site SRROO	2000 - 3 suites	OK					
	ADEQ Clean Lakes ProgramSRROO-A 100075	1996 - 1 suite 2000 - 1 suite	OK					
	ADEQ Clean Lakes ProgramSRROO-B 100076	1996 - 1 suite 2000 - 1 suite	OK					Missing core parameters: bacteria, boron, beryllium

TABLE 19. SALT WATERSHED – DATA MONITORING – 2002 ASSESSMENT

STREAM NAME SEGMENT WATERBODY ID DESIGNATED USES	AGENCY AND PROGRAM SITE DESCRIPTION SITE CODE ADEQ DATABASE ID	YEAR SAMPLED NUMBER AND TYPE OF SAMPLES	STANDARDS EXCEEDED AT THIS SITE PER SAMPLING EVENT					
			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	ADEQ Clean Lakes ProgramSRROO-C 100077	1996 - 1 suite 2000 - 1 suite	OK					
	ADEQ Clean Lakes ProgramSRROO-D 100078	1996 - 1 suite	OK					
	ADEQ Clean Lakes Program SRROO-E 100079	1996 - 1 suite	OK					
	Reach Summary Row A&Ww Inconclusive FC Inconclusive DWS Inconclusive Agl Inconclusive AgL Inconclusive	1996 - 2000 34 samples 10 sampling events Missing core parameters	Dissolved oxygen mg/L	6.0 (90% saturation) (A&Ww)	5.32 - 13.15	2 of 33	Inconclusive	ADEQ & AGFD collected a total of 34 samples at 9 sites in 1996 & 2000. Lake assessed as "inconclusive" due to missing core parameters.
Saguaro Lake AZL15060106A-1290 A&Wc, FC, FBC, DWS, Agl, AgL	ADEQ Lakes Program SRSAG-BJ 100081	1999 - 1 suite	Dissolved Oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.07 - 6.11	1 of 1		Low dissolved oxygen attributed to natural lake turnover of the water column in October, a seasonal condition. Not used in the final assessment.
	ADEQ Lakes Program SRSAG-A 100082	1996 - 1 suite 1999 - 1 suite 2000 - 1 suite	Dissolved Oxygen mg/L	7.0 (90% saturation) (A&Wc)	5.63 - 10.49	1 of 3		Naturally occurring low dissolved oxygen (see note above).
	ADEQ Fixed Station Monitoring Lakes Program At Marina SRSAG-MAR1 100994	2000 - 1 VOCs	OK					Missing core parameters: bacteria
	ADEQ Lakes Program SRSAG-MAR2 100995	1999 - 1 field 2000 - 1 VOCs, 1 inorganics						
	ADEQ Lakes Program SRSAG-BAG 101001	1999 - 1 suite						
	AGFD Routine Monitoring Above Bagley Flats SRSAG	1999 - 6 field, 6 NH3, 6 nutrients 2000 - 2 field, 2 NH3, 2 nutrients	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.1 - 9.85	1 of 8		Naturally occurring low dissolved oxygen (see note above).
	AGFD Routine Monitoring Peregrine Cove SRSAG	1999 - 6 field, 6 NH3, 6 nutrients 2000 - 2 field, 2 NH3, 2 nutrients	Dissolved oxygen mg/L	7.0 (90% saturation) (A&Wc)	6.2 - 10.02	1 of 8		Naturally occurring low dissolved oxygen (see note above).
	AGFD Routine Monitoring Dam site SRSAG	1999 - 5 field, 5 NH3, 5 nutrients 2000 - 2 field, 2 NH3, 2 nutrients	OK					Missing core parameters: turbidity, metals, bacteria, boron, fluoride, barium

TABLE 19. SALT WATERSHED – DATA MONITORING – 2002 ASSESSMENT

STREAM NAME SEGMENT WATERBODY ID DESIGNATED USES	AGENCY AND PROGRAM SITE DESCRIPTION SITE CODE ADEQ DATABASE ID	YEAR SAMPLED NUMBER AND TYPE OF SAMPLES	STANDARDS EXCEEDED AT THIS SITE PER SAMPLING EVENT					
			PARAMETER UNITS	STANDARD (DESIGNATED USE)	RANGE OF RESULTS (MEAN)	FREQUENCY EXCEEDED STANDARD	DESIGNATED USE SUPPORT	COMMENTS
	Reach Summary Row A&Wc Attaining FC Attaining FBC Inconclusive DWS Attaining Agl Attaining AgL Attaining	1996 - 2000 29 sampling events Missing core parameters	OK				Attaining	ADEQ & AGFD collected a total of 29 samples from 8 sites in 1996-2000. Lake assessed as "attaining some uses." Add to Planning List due to missing bacteria samples.

Information for interpreting these Monitoring Tables

- < "Segment" designates the beginning and end points of the reach.
- "Waterbody ID" is derived from combining the following: AZ (for streams) or AZL (for lakes) + a US Geological Survey Hydrologic Unit Code + EPA stream reach number or ADEQ lake number.
- "Designated Uses," "Agency," and "Units" (of measurement) abbreviations are defined in Appendix A.
- "Site Code" is an ADEQ derived abbreviation for the surface water basin, stream name or lake name, and the location of the site. For streams, the numbers are the miles upstream from mouth (normally measured as a straight line vector).
- "ADEQ Database ID" -- This is ADEQ's water quality database reference number. If the data is not in this database, no number will be shown.
- "Samples" -- The year and number of water samples is shown. The federal "water year" is used, from October 1st through September 30th, rather than the calendar year. Types of samples:
 - < "Suite" indicates that a broad range of chemical constituents were collected and field measurements were taken (normally inorganics, metals, nutrients, and bacteria.) The chemical constituents monitored are not consistent among the many monitoring entities that provided the data. If the suite did not include the core parameters needed to assess a designated use as "attaining," the missing core parameters are indicated.
 - < "Field" indicates that only field measurements such as dissolved oxygen, pH, turbidity, and water temperature were collected.
 - < If a specific parameter or parametric group (e.g., zinc, metals, bacteria) is named, monitoring was limited to only these parameters
- "Standards Exceeded at this Site per Sampling Event."
 - < Although many parameters may be analyzed, only those exceeding a standard are shown. Other parameters were collected.
 - < "OK" indicates that no standards were exceeded.
 - < The specific standards are shown as a single parameter may have multiple standards depending on the designated uses assigned. (See standards in Appendix C.)
 - < "The Range of Results" indicates the minimum and maximum sample results. If the laboratory reported result is "less than the detection limit" or "not detected," a less than (<) value will be shown along with the detection limit (e.g., <0.5 mg/L).
 - < A mean, geometric mean, or median will be shown along with the range of results if applicable to the standard or assessment criteria.
- < "Comments" include other information used in interpreting the data for assessments, such as evidence that exceedance is solely due to natural conditions, or that the data does not meet the new "credible" data requirements.
- < In the "Summary Row" parameter exceedances are combined from multiple sites, and the assessment of each designated use is shown. The overall assessment for the surface water is described in the "Comments" field: "Attaining," "Not attaining," "Impaired," or "Inconclusive." See assessment criteria in Chapter III of Volume I.

Ground Water Assessments in the Salt Watershed

Major Ground Water Stressors -- Monitoring data collected from wells in this watershed between October 1995-October 2000 are summarized in **Table 20** and illustrated in **Figure 36, 37, and 38**.

As **Table 20** indicates, only 17 wells were sampled. Among these wells, the only constituents with standards analyzed were fluoride, metals, and nitrates. This is not enough water quality information to base a groundwater assessment; however, it should be noted that among those samples, no standards were exceeded.

TDS Concentrations – Water quality can be characterized based on concentration of Total Dissolved Solids (TDS). No TDS water quality standards apply in this watershed; however, elevated salinity limits the practical uses of ground water as TDS over 500 mg/L has an off-flavor, and TDS over 1000 mg/L will limit its use for some crops. In this watershed, TDS was monitored only in two wells (**Figure 37**). This is not enough samples to characterize water quality.

Nitrate Concentrations – Water quality can also be characterized by looking at the concentration of nitrate in ground water (**Figure 38**). Naturally occurring nitrate concentrations in ground water are generally below 3 mg/L. Concentrations above 5 mg/L indicate potential anthropogenic sources of nitrate. Of the 17 wells monitored for nitrate, two exceeded this 5 mg/L concentration (12% of the wells). Exceedances may be related to historic irrigated agriculture or septic systems.

When nitrate concentrations exceed 10 mg/L, Arizona's Aquifer Water Quality Standard has been exceeded. This standard was set to protect human health, as water with nitrate greater than 10 mg/L may present a health problem for babies and should not be consumed by nursing mothers. None of the 17 wells monitored exceeded 10 mg/L. However, efforts should be taken to minimize further contamination of ground water by nitrate.

Table 20. Salt Watershed Ground Water Monitoring 1996 - 2000

MONITORING DATA TYPE	PARAMETER OR PARAMETER GROUP	NUMBER OF WELLS			PERCENT OF WELLS EXCEEDING STANDARDS
		SAMPLED	SYNTHETIC CONSTITUENT DETECTED*	EXCEEDING STANDARDS	
INDEX WELLS	Radiochemicals	0		--	--
	Fluoride	0		--	--
	Metals/Metalloids	0		--	--
	Nitrate	0		--	--
	VOCs + SVOCs*	0	--	--	--
	Pesticides	0	--	--	--
TARGETED MONITORING WELLS	Radiochemicals	0		--	--
	Fluoride	17		0	0%
	Metals/metalloids	17		0	0%
	Nitrate	17		0	0%
	VOCs + SVOCs*	0	—	—	--
	Pesticides	0	—	—	—

WELL CLASSIFICATION BY TOTAL DISSOLVED SOLIDS (TDS) CONCENTRATION				
Total Number of Wells (all targeted wells)	Wells <500 mg/L Acceptable drinking water flavor	Wells 500-999 mg/L Fresh (not saline) Some crop production problems	Wells 1000-3000 mg/L Slightly saline Increasing crop production problems	Wells >3000 mg/L Moderately saline to briny Severe crop production problems
2	2	0	0	0

WELL CLASSIFICATION BY NITRATE CONCENTRATION (measured as Nitrogen)			
Total Number of Wells (all targeted wells)	Wells <5 mg/L	Wells 5-10 mg/L May be an anthropogenic source of Nitrates	>10 mg/L Exceeds standards Should not be used for drinking water by babies or nursing mothers
17	15	2	0

*VOCs = volatile organic compounds; SVOCs = semi-volatile organic compounds.

*The detection of a synthetic constituent (pesticides, VOCs, and SVOCs) is noted because some do not have standards and these substances are not naturally occurring in the ground water.

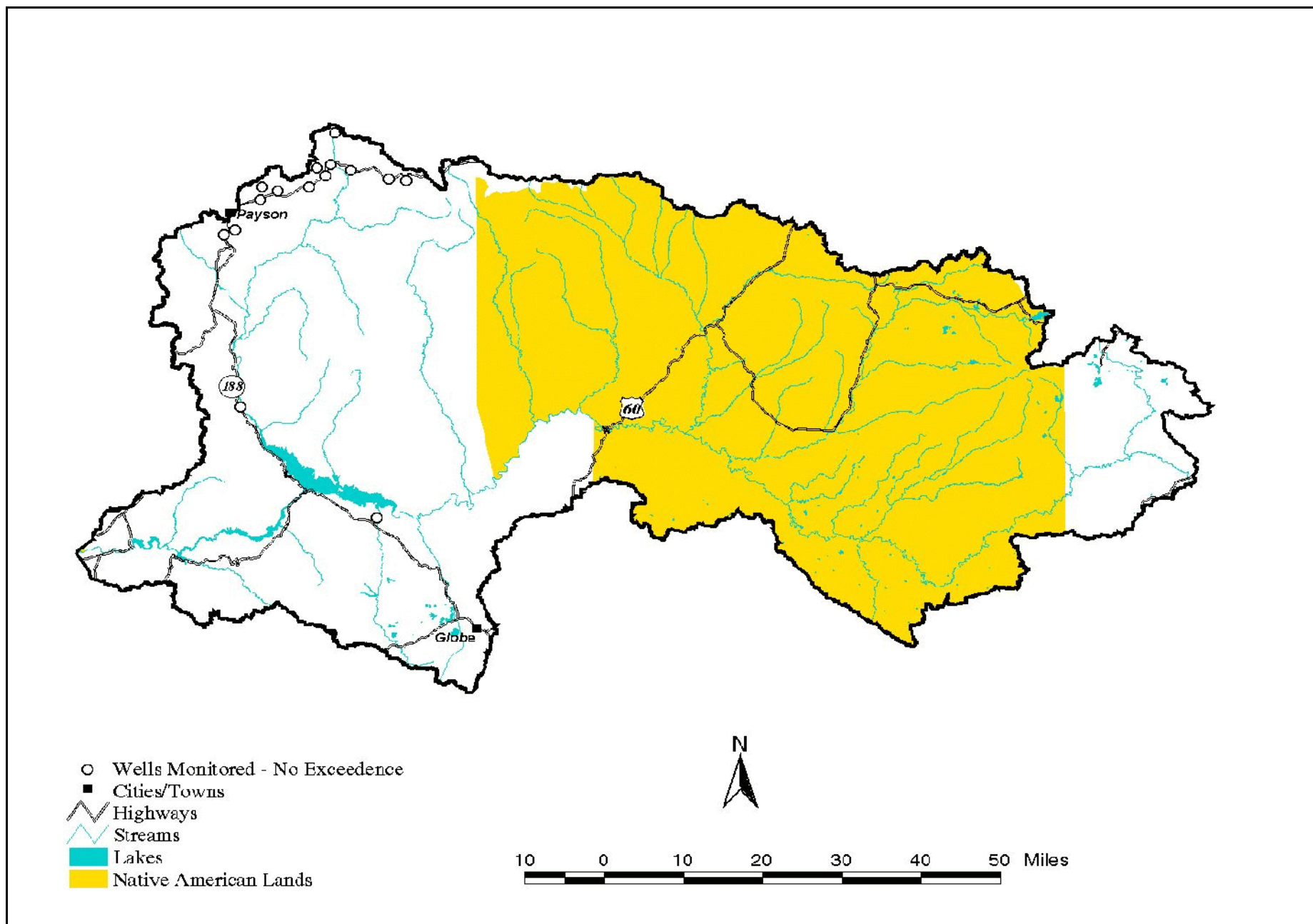


Figure 36. Ground Water Monitoring in the Salt Watershed – 1996-2000

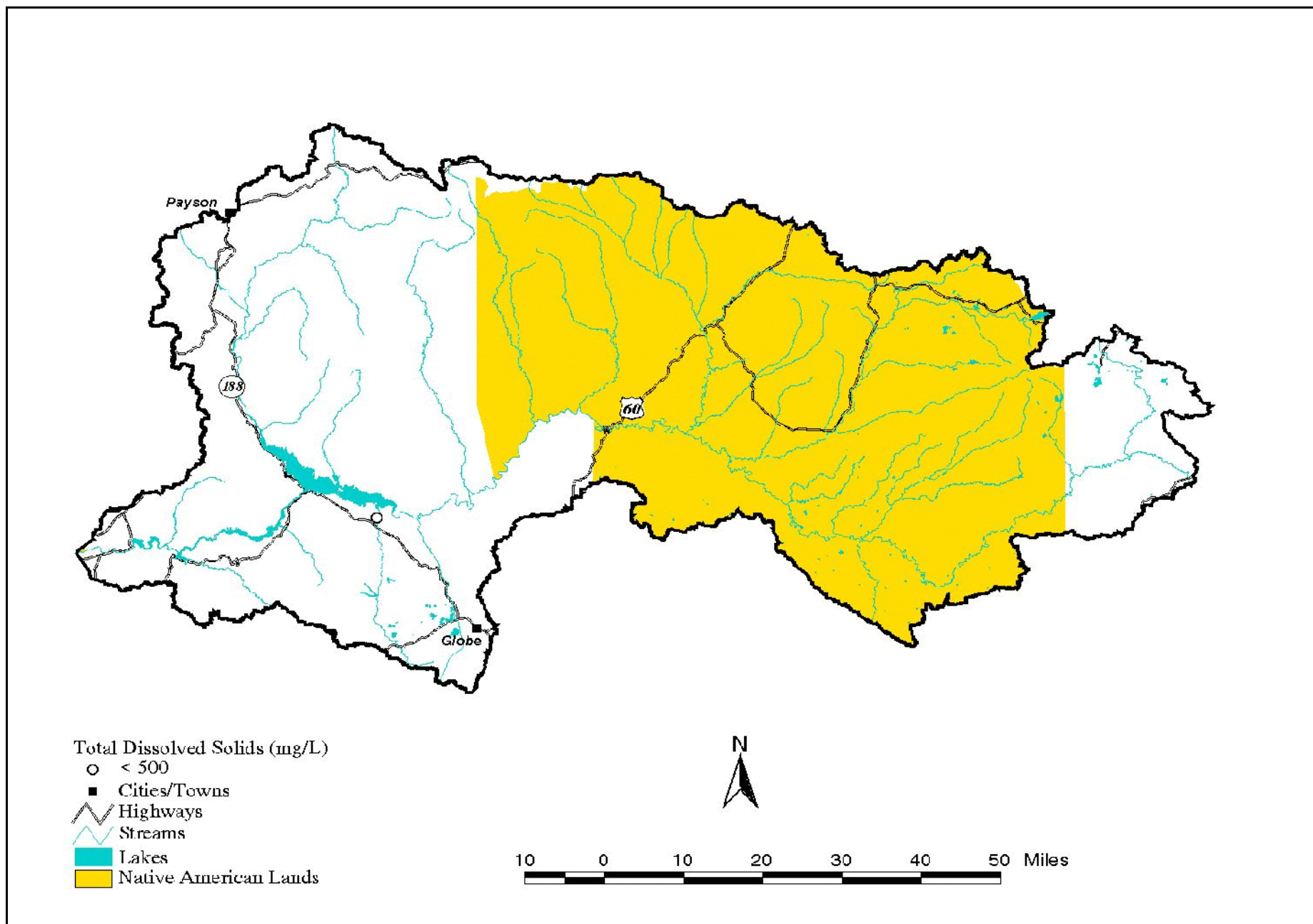


Figure 37. Classification of Ground Water Quality by TDS Concentration in the Salt Watershed

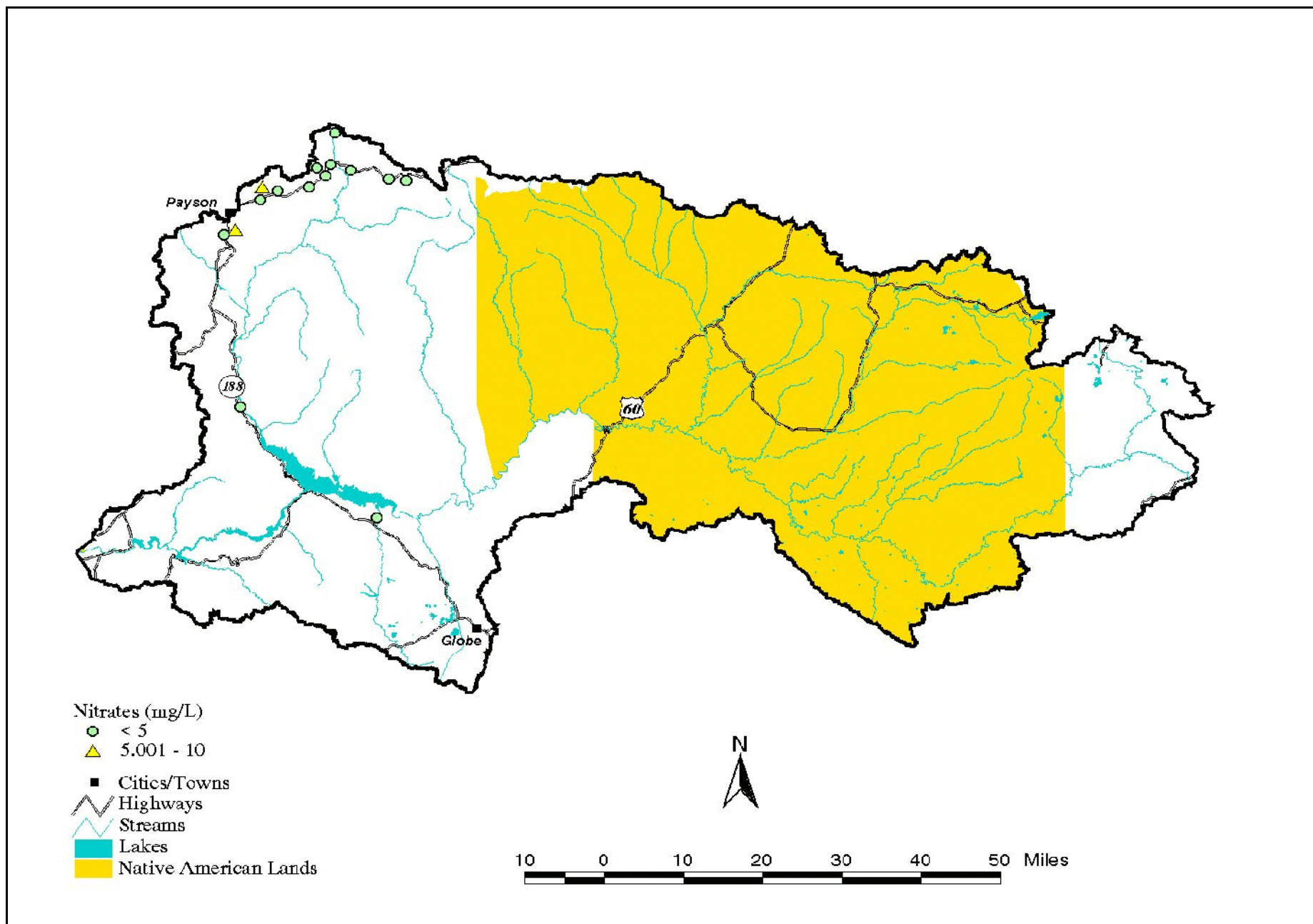


Figure 38. Classification of Ground Water Quality by Nitrate Concentration in the Salt Watershed

Watershed Studies and Alternative Solutions in the Salt Watershed

This section highlights surface and ground water studies, mitigation projects, and remediation activities which have been conducted to improve water quality in the Salt Watershed. Watershed partnerships active in this watershed are also described.

Surface Water Studies and Mitigation Projects

Total Maximum Daily Load Analyses – The following TMDL analyses have been completed or are ongoing in this watershed. Further information about the status of these investigations can be obtained by contacting the TMDL Program manager at (602) 771-4468, or at ADEQ's web site:

<http://www.adeq.state.az.us/environ/water/assess/tmdl.html>

- < The Pinto Creek Phase I Copper TMDL -- This TMDL was completed and approved by EPA in April 2001. ADEQ is currently involved in the sampling and analysis for a Phase II TMDL on this stream. This TMDL was established to define goals for the watershed necessary to achieve water quality criteria for dissolved copper. This water quality criterion varies with hardness in the water; the dissolved copper standard being more stringent with less water hardness.

The entire Pinto Creek, from its headwaters to Roosevelt Lake, was originally included on the 303(d) List as impaired by copper. Current monitoring and analysis indicates that Pinto Creek below the Pinto Valley Weir (or below Ripper Springs Creek) consistently meets all surface water standards and should be delisted.

Loading capacities were calculated for five stream flow events at nine target sites (locations), resulting in 45 different Total Maximum Daily Loads. At lowest flows (down to 0 cubic feet per second flow), the allocations are articulated on a concentration basis (mg/L) rather than a mass loading basis (mg/day). These concentration allocations are based on the standard that varies by water hardness.

A waste load allocation was established for the BHP Pinto Valley Mine outfall 005 and nonpoint source loading allocations were established

for potential sources that contribute drainage to Pinto Creek at Miller Spring Gulch, Gold Gulch, and North and South Ripper Spring canyons. These allocations were calculated based on the assumption that the proposed Carlotta Copper Mine will be developed along Pinto Creek. This assumption affected the allocations in two ways:

- < Stream discharge values assumed proposed facilities were in place, and
- < The Cactus Breccia Formation would no longer be a source of dissolved copper to Pinto Creek (due to mining and the Pinto Creek diversion).

Water quality management and remediation goals were set by this Phase I TMDL. EPA recognized that abandoned mines present significant technical, legal, and monetary challenges to designing and implementing remedial measures. Given the copper levels within Pinto Creek, and the potential to control one significant source of contamination (Gibson Mine, an abandoned mine), EPA believes that it is technically feasible to meet the proposed loading allocations.

To support the Pinto Creek Phase II Copper TMDL, ADEQ is collecting water quality data at 24 locations, monitoring continuous stream flow, and collecting precipitation data over a 12 to 18 month period. This data will be used to construct, calibrate and validate a dynamic point and non-point source model of the Pinto Creek watershed. The sample plan will attempt to further identify and quantify the source of copper from natural and from anthropogenic point and non-point sources, as well as monitor the effectiveness of any mitigation efforts implemented at the Gibson Mine.

- Tonto Creek TMDL Study – In 2000, ADEQ initiated monitoring to support phosphorus, nitrogen, and *Escherichia coli* TMDLs in a segment of Tonto Creek, from its headwaters to the Bear Flats residence area below Christopher Creek. Up to six nutrients, bacteria, and turbidity samples were collected at eleven sampling sites in 2000 to determine the extent of contamination and contribution from possible

sources. Potential sources identified included: wildlife, recreation, septic tanks, and state fish hatchery.

Monitoring indicates that *Escherichia coli* should be delisted, as only two out of 41 samples exceeded this standard. ADEQ is also proposing to remove the nutrients on Tonto Creek from the 303(d) List as no single sample maximum nutrient standards were exceeded. More data is being collected (summer of 2002) to verify that the annual mean standards for nitrogen or phosphorus will not be exceeded.

Repeated exceedances of the turbidity standard during this monitoring indicates that turbidity is impairing Aquatic and Wildlife uses on this stream; therefore, this stressor should be added to the 303(d) List.

- Christopher Creek TMDL Study – ADEQ also initiated a TMDL for nitrogen on Christopher Creek in 2000. The study area included all of Christopher Creek, from its headwaters to its confluence with Tonto Creek. Eight sites were sampled up to six times in 2000 to determine the extent of contamination and contribution from possible sources of excess nitrogen. The potential sources of nitrogen were identified as: wildlife, recreation, and septic tanks.

The single sample maximum phosphorus and nitrogen standards were not exceeded in 39 samples. ADEQ is collecting (summer 2002) additional samples to verify that the annual mean nutrient standards are not being exceeded. Based on existing data, ADEQ is proposing to remove nutrients on Christopher Creek from the 303(d) List.

Sampling did indicate that turbidity is impairing Aquatic and Wildlife uses on this stream; therefore, this stressor should be added to the 303(d) List.

BHP NPDES Permit Monitoring in Pinto Creek -- The BHP Pinto Valley Operations mine discharges into Pinto Creek. AMEC Earth and Environmental, Inc., a consultant for BHP, sampled six locations to fulfill requirement of the NPDES permit for the mine.

These samples were used in this assessment except for the data collected following a spill event (October 22, 1997 - July 31, 1998), as the cleanup of all

contaminants from this spill has subsequently been completed.

Water Quality Improvement Grants – ADEQ awarded the following Water Quality Improvement Grants in this watershed.

- Lower Salt River Pollution Prevention Education and Outreach Project – The Tonto National Forest, Mesa Ranger District was funded in 2001 to install three restroom facilities along the Salt River below Saguaro Lake, conduct public education and outreach, and obtain bacterial water quality samples for two years. The project is to improve river water quality, by reducing bacteria levels due to intense recreational usage. The river has not been listed for impairments due to bacteria levels; however, previously restroom facilities were not available along a significant portion of this heavily used river.

This grant project is ongoing, with the first bacterial samples being collected in July of 2001 through September 2001. The second round of sampling will occur in the summer of 2002. For more information about the project, contact the Tonto National Forest, Mesa Ranger District at (480) 610-3312.

Water Protection Fund Projects – The following projects received Water Protection Funds from the Arizona Department of Water Resources:

- Lofer Cienega Restoration Project – The White Mountain Apache Tribe was funded to restore the large Lofer Cienega. This project incorporates stream assessments, long-term monitoring, fence construction, grazing management, biological assessments, and feral horse trapping and removal in an attempt to restore Lofer Cienega. When restored, this cienega should provide critical wildlife and fish habitat. In addition, it is a significant cultural resource to the tribe.
- Gooseberry “Watershed” Restoration Project – The White Mountain Apache Tribe was also awarded funds in 1999 to restore the Gooseberry drainage area by improving management of the riparian meadows and reconstructing stream crossings. The project incorporated stream assessments, improved riparian grazing management, cleanup projects and public education, channel restoration and biologic assessments to meet its goals.

- Cherry Creek Enhancement Demonstration Project – The Tonto National Forest received Watershed Protection Funds to restore one degraded mile of Cherry Creek. The Forest Service is to assess the project site, including a topographic survey and evaluation of the site's characteristics and hydrology. The dimension, pattern, and profile of a selected reference channel will be used to guide the design of the restoration channel reconfiguration.
- Dakini Valley Riparian Project along Gordon Creek -- Dakini Valley LLC received funds to protect approximately one-half mile of Gordon Creek from overgrazing by constructing a two-mile long elk fence around the area. Cat claw, that has invaded two acres of Gordon Creek terrace, is to be cut down, the area reseeded with native grasses, and emory oak trees are to be planted along the stream bank. Two dirt tanks at Bear Flat are also to be repaired to provide off-channel water for cattle and elk. Informational signs and literature describing the project resource issues and goals are to be provided for visitors and guests at Dakini Valley.

Ground Water Studies and Mitigation Projects

Federal and State Superfund Cleanup Sites -- One Superfund site and one Department of Defense cleanup site are located in this watershed.

- Pinal Creek WQARF Superfund Site – The Pinal Creek Group, an alliance of mining companies (BHP Copper, Inc, Inspiration Consolidated Copper Co., and Phelps Dodge Miami, Inc.), is performing cleanup activities at a WQARF superfund site located in the Pinal Creek sub-watershed near the Globe-Miami area. At this site metal-bearing acidic ground water is contaminating surface water in Pinal Creek.

Since 1987, the Pinal Creek Group has been pumping and treating ground water from a shallow and narrow aquifer underlying Bloody Tanks Wash and Pinal Creek. In November 1999, the Lower Pinal Creek Treatment Plant commenced operations to treat and then discharge treated water into the Pinal Creek surface flow. In May 2001, a second treatment plant and well field commenced operations to

capture and treat groundwater in the Bloody Tanks Wash, the main tributary that previously fed contaminated ground water to Pinal Creek. As a result of the remedial activities at the mining sites and operation of treatment plants and well field containment systems, the metal concentrations and the pH are now meeting Arizona surface water quality standards. The Pinal Creek Group will continue these remedial activities to ensure safe surface water quality under a federally approved Consent Decree between ADEQ and the Pinal Creek Group.

- Waterdog Recreational Annex Cleanup Site -- The Waterdog Recreation Area is a Department of Defense cleanup site located on the eastern shore of Apache Lake. This recreation area was originally an annex to Williams Air Force Base, constructed to provide access to Apache Lake for military and civilian air force personnel.

An inspection in 1991 of the three underground storage tanks used to fuel the boats revealed petroleum hydrocarbons were contaminating ground water and soils, and resulted in the removal of the storage tanks. Further remediation of the soils using a bioventing system began in 1995. Ground water samples from monitor wells in 1999 indicated petroleum contamination above the Arizona Aquifer Water Quality Standards. Quarterly ground water sampling will continue until the petroleum contamination is reduced to levels below these standards. The petroleum contamination is expected to be reduced due to both natural attenuation and on-going remediation activities.

Watershed Partnerships

The Lower Verde-Lower Salt Watershed Advisory Group – This advisory group, formed 1999, is comprised of private citizens, U.S. Forest Service, ADEQ, Arizona Department of Water Resources, and Salt River Project. Key issues this group has focused on include:

- litter on lakes and rivers,
- potential for MTBE contamination in lakes,
- land use and traffic control,
- public education and outreach regarding environmental issues, and
- enforcement of existing environmental laws and regulations.

For information about meetings contact either Dan Jones, at the Maricopa County Sheriffs Office D_Jones@mcso.maricopa.gov and Lynda Bearult with Salt River Tubing Lynda@Saltrivertubing.com.